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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/797,595

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Yusuke Sakagami

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EXAMINER

GARCIA JR, RENE

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 08/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/797,595	<b>Applicant(s)</b> SAKAGAMI ET AL.	
	<b>Examiner</b> Rene Garcia, Jr.	<b>Art Unit</b> 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 4,5 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4,5 and 11 is/are allowed.
- 6) ☒ Claim(s) 12-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Withdraw of Allowable Subject Matter***

1. The indicated allowable subject matter of claims 12-18 is withdrawn. Fukano (JP 63-141750) [which has been translated for pending related application 10/789,819] includes relevant teachings of using an oscillation circuit for ejection detecting means as outlined in rejection following.

### ***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

3. As stated in office action sent 10 February 2006, information disclosure statement filed 24 September 2004 was objected to because it was not provided to the office. For clarification purposes there was documentation filed indicating disclosure of relevant documents. In particular on page 2 there is indicated a cross reference applicant would liked considered, however no physical information disclosure statement filed in accordance with 37 CFR 1.98(a)(1) (i.e. no listing of document(s) to consider with column for examiner to initial if considered or not considered). Examiner has considered the cross reference listed on page 2 (10/797,594 also US PGPUB 2004/0239714) and listed it currently filed PTO-892 form as the US PGPUB 2004/0239714.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2853

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukano (JP 63-141750) in view of Billet (US 6,010,205).

**Fukano discloses the following claimed limitations:**

\*regarding claim 12, droplet ejection apparatus/**inkjet recording device**/ (page 2, line 13) having a driving circuit/**buffers, 1 & 2; transistors, 4, 5 & 6; resistance, 12, 13, 14 & 15**/ (fig1; page 4, lines 19-21), and a droplet ejection head/**inkjet recording head, 28**/ (fig. 3; page 3 line 23) including a cavity/**ink chamber, 23**/ filled with a liquid/**ink**/ (fig. 3; page 3 lines 23-24), a nozzle/**25**/ communicated with the cavity/**23**/, and an actuator/**piezo-electric element, 9**/ (fig 3; page 4 line 3), the droplet ejection head/**28**/ ejecting the liquid/**ink**/ within the cavity/**23**/ through the nozzle/**25**/ in the form of droplets (page 6 lines 12-14) by driving the actuator/**9**/ by means of the driving circuit/**buffers, 1 & 2; transistors, 4, 5 & 6; resistance, 12, 13, 14 & 15**/ to change an internal pressure of the cavity/**23**/ so that the ejected droplets land on the droplet receptor (page 6 lines 12-14; page2 lines 18-20), the droplet ejection apparatus/**inkjet recording device**/ comprising:

\*ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21**/ (fig 1; page 5 lines 14-16) for detecting an ejection failure of the droplet ejected through each of the nozzles (page 6 line 20 – page 7 line 2)

\*wherein:

\*ejection failure detecting means detects the ejection failure with respect to a droplet ejection operation of each droplet ejected through the nozzles the droplet ejection head ejects the droplets onto the droplet receptor (page 6 line 20 – page 7 line 2)

\*droplet ejection head/28/ includes a diaphragm/oscillating plate, 26/ (fig. 3; page 4 lines 1-2) that is displaced when the actuator/piezo-electric element, 9/ is driven, and wherein the ejection failure detecting means detects a residual vibration of the diaphragm/26/ and determines an ejection failure based on a vibration pattern of the detected residual vibration of the diaphragm/26/ (page 6 line 17 – page 7 line 2)

\*ejection failure detecting means/buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/ (fig 1; page 5 lines 14-16) includes an oscillation circuit/piezo-electric element, 9 & resistance, 13 & 14/ (fig. 1; page 5 lines 17-20) and the oscillation circuit oscillates in response to an electric capacitance component of the actuator/9/ that varies with the residual vibration of the diaphragm/26/ (page 5 line 21 – page 6 line 16)

\*regarding claim 13, ejection failure detecting means/buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/ (fig 1; page 5 lines 14-16) includes a resistor element/resistance, 16/ connected to the actuator/piezo-electric element, 9/, and the oscillation circuit/piezo-electric element, 9 & resistance, 13 & 14/ (fig. 1; page 5 lines 17-20) forms a CR oscillation circuit/capacitor, 10 & resistance, 16/ based on the electric capacitance component of the actuator/9/ and a resistance component of the resistor element/16/ (fig 1; page 4 lines 22-24)

\*regarding claim 14, ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes an F/V converting circuit/**waveform rectifying circuit/** that generates a voltage waveform (fig. 4d page 7 lines 13-15; fig. 5d page 8 line 2-4) in response to the residual vibration of the diaphragm/26/ from a predetermined group of signals (fig. 2) generated based on changes in an oscillation frequency of an output signal from the oscillation circuit (page 7 line 13- page 8 line 19)

\*regarding claim 15, ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes a waveform shaping circuit/**capacitor, 10; diode, 11; resistance, 16/** (fig. 2; page 7 lines 3-13) that shapes the voltage waveform in response to the residual vibration of the diaphragm generated by the F/V converting circuit into a predetermined waveform (fig. 4c; fig. 5c)

\*regarding claim 16, waveform shaping circuit includes: DC component eliminating means/**capacitor, 10/** for eliminating a direct current component from the voltage waveform of the residual vibration of the diaphragm generated by the F/V converting circuit (page 7 line 7-10)

\*comparator (page 8 line 20 – page 9 line 5) that compares the voltage waveform from which the direct current component thereof has been eliminated by the DC component eliminating means with a predetermined voltage value; and wherein the comparator generates and outputs a rectangular wave (fig. 4d; fig 5d) based on this voltage comparison

**Fukano does not disclose the following claimed limitations:**

\*regarding claim 12, droplet ejection apparatus having

Art Unit: 2853

\*reciprocating mechanism for the purpose of moving the print heads across a medium

\*plurality of droplet ejection heads

\*driving the actuator by means of the driving circuit to change an internal pressure of the cavity while moving the plurality of droplet ejection heads relatively with respect to a droplet receptor by the reciprocating mechanism

\*wherein the ejection failure detecting means detects the ejection failure with respect to a droplet ejection operation of each droplet ejected through the nozzles when the plurality of droplet ejection heads eject the droplets onto the droplet receptor

\*regarding claim 17, ejection failure detecting means includes measuring means for measuring the cycle of the residual vibration of the diaphragm based on the rectangular wave generated by the waveform shaping circuit

\*regarding claim 18, measuring means has a counter, and measures either a time between rising edges of the rectangular wave or a time between a rising edge and falling edge of the rectangular wave by counting pulses of a reference signal with the counter

**Billet discloses the following:**

\*regarding claim 12, droplet ejection apparatus/**print device, 2/** having

\*reciprocating mechanism (col. 2, lines 50-54) for the purpose of moving the print heads across a medium

\*plurality of droplet ejection heads/**print heads, 6-28/** (col. 2, lines 32-49) for the purpose of creating an image faster or with different inks

\*driving the actuator by means of the driving circuit to change an internal pressure of the cavity while moving the plurality of droplet ejection heads relatively with respect to a droplet receptor/**sheet, 4/** by the reciprocating mechanism for the purpose of creating image on medium

\*wherein the ejection failure detecting means detects the ejection failure with respect to a droplet ejection operation of each droplet ejected through the nozzles when the plurality of droplet ejection heads eject the droplets onto the droplet receptor (fig. 1 col. 4, lines 2-12 and line 60) for the purpose of detecting ejection failure with respect to a plurality of heads

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a droplet ejection apparatus having: reciprocating mechanism for the purpose of moving the print heads across a medium; plurality of droplet ejection heads; driving the actuator by means of the driving circuit to change an internal pressure of the cavity while moving the plurality of droplet ejection heads relatively with respect to a droplet receptor by the reciprocating mechanism; and wherein the ejection failure detecting means detects the ejection failure with respect to a droplet ejection operation of each droplet ejected through the nozzles when the plurality of droplet ejection heads eject the droplets onto the droplet receptor as taught by Billet into Fukano for the purposes of: moving the print heads across a medium; creating an image faster or with different inks; creating image on medium; and detecting ejection failure with respect to a plurality of heads

**Fukano discloses the following:**

\*regarding claim 17, ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes measuring means for measuring the cycle of the residual vibration of the diaphragm/**26/** based on the



Art Unit: 2853

rectangular wave generated by the waveform shaping circuit (page 6, line 20 – page 7 line 2; detects the period of the oscillating waveform to determine if bubble occurs or runs out of ink, therefore has implied measuring means) for the purpose of comparing waveforms to detect ejection failure

\*regarding claim 18, measuring means has a counter, and measures either a time between rising edges of the rectangular wave or a time between a rising edge and falling edge of the rectangular wave by counting pulses of a reference signal with the counter (since has implied measuring means, as stated with regards to claim 17, has to have a way to count a time period associated with waveform [page 8 line 2-6] to compare  $T_2$  to normal) for the purpose of comparing waveforms to detect ejection failure

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize ejection failure detecting means includes measuring means for measuring the cycle of the residual vibration of the diaphragm based on the rectangular wave generated by the waveform shaping circuit; and measuring means has a counter, and measures either a time between rising edges of the rectangular wave or a time between a rising edge and falling edge of the rectangular wave by counting pulses of a reference signal with the counter as taught by Fukano for the purpose of comparing waveforms to detect ejection failure

***Allowable Subject Matter***

6. Claims 4, 5 and 11 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for indicating allowable subject matter of claims 4 and 5 is the inclusion of

the limitation of a droplet ejection apparatus including droplet receptor transporting means which carries out discharge and feed of the droplet receptor; wherein, in the case where the number of ejection failures with respect to the droplet receptor counted by the counting means when the plurality of droplet ejection heads eject the droplets onto the droplet receptor exceeds a predetermined reference value, the droplet ejection apparatus stops the droplet ejection operation onto the droplet receptor, and operate the droplet receptor transporting means to discharge the droplet receptor from and feed another droplet receptor to the droplet ejection apparatus to carry out a new and same droplet ejection operation with respect to the fed droplet receptor. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.


8. The primary reason for indicating allowable subject matter of claim 11 is the inclusion of the limitation of a droplet ejection apparatus including judging means judges that paper dust is adhering in the vicinity of the outlet of the nozzle in the case where the cycle of the residual vibration of the diaphragm is longer than the predetermined range of cycle and shorter than the predetermined threshold. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.


*Communications with the USPTO*

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Rene Garcia Jr  
08/06

  
**STEPHEN MEIER**  
**SUPERVISORY PATENT EXAMINER**